Claims

1. A refrigerant leak detector of a compressor, comprising:

a compressor that compresses and supplies a flammable refrigerant to a refrigeration cycle of a refrigerator;

a brushless DC motor that drives the compressor;

a switching circuit that supplies drive signals to the brushless DC motor;

control means that PWM-controls the switching circuit;

direct-current power supplying means that supplies drive-use direct current power to the switching circuit;

duty measuring means that measures the duty value of a PWM signal in the control means;

drive value measuring means that measures drive values such as voltage, current and power relating to the direct-current power supplied by the direct-current power supplying means;

duty determining means that determines whether or not the duty value measured by the duty measuring means exceeds a duty variation width where the duty value measured at a duty measurement reference time is used as a reference;

drive value determining means that determines whether or not a time rate-of-change per unit time of the drive value measured at the drive value measurement reference time by the drive value measuring means exceeds a drive value reference

rate-of-change; and

refrigerant leak determining means which determines that the flammable refrigerant is leaking when it is determined in the duty determining means that the duty variation width has been exceeded and it is determined in the drive value determining means that the drive value reference rate-of-change has not been exceeded or which determines that the flammable refrigerant is not leaking when it is determined in the duty determining means that the duty variation width has been exceeded and it is determined in the drive value determining means that the drive value reference rate-of-change has been exceeded.

2. The refrigerant leak detector of a compressor of claim 1, wherein the duty measurement reference time and the drive value measurement reference time are set to different times.

3. A refrigerant leak detector of a compressor, comprising:

a compressor that compresses and supplies a flammable refrigerant to a refrigeration cycle of a refrigerator;

a brushless DC motor that drives the compressor;

a switching circuit that supplies drive signals to the brushless DC motor;

control means that PWM-controls the switching circuit;

direct-current power supplying means that supplies

drive-use direct current power to the switching circuit;

duty measuring means that measures the duty value of a PWM signal in the control means;

drive value measuring means that measures drive values such as voltage, current and power relating to the direct-current power supplied by the direct-current power supplying means;

duty determining means that determines whether or not a time-of-rate change per unit time of the duty value measured at a duty measurement reference time by the duty measuring means exceeds a duty reference rate-of-change;

drive value determining means that determines whether or not the drive value measured by the drive value measuring means exceeds a drive value variation width where a drive value measured at a drive value measurement reference time is used as a reference; and

refrigerant leak determining means which determines that the flammable refrigerant is leaking when it is determined in the duty determining means that the duty time rate-of-change has been exceeded and it is determined in the drive value determining means that the drive value variation width has not been exceeded or which determines that the flammable refrigerant is not leaking when it is determined in the duty determining means that the duty time rate-of-change has been exceeded and it is determined in the drive value determining

means that the drive value variation width has been exceeded.

4. The refrigerant leak detector of a compressor of claim 3, wherein the duty measurement reference time and the drive value measurement reference time are set to different times.

5. A refrigerant leak detector of a compressor, comprising:

a compressor that compresses and supplies a flammable refrigerant to a refrigeration cycle of a refrigerator;

a brushless DC motor that drives the compressor;

a switching circuit that supplies drive signals to the brushless DC motor;

control means that PWM-controls the switching circuit;

duty measuring means that measures the duty value of a PWM signal in the control means;

first duty determining means that determines whether or not the duty value measured by the duty measuring means exceeds a duty variation width where a duty value measured at a first duty measurement reference time is used as a reference;

second duty determining means that determines whether or not a time rate-of-change per unit time of a duty value measured at a second duty measurement reference time by the duty measuring means exceeds a duty reference rate-of-change; and

refrigerant leak determining means which determines that

the flammable refrigerant is leaking when it is determined in the first duty determining means that the duty variation width has been exceeded and it is determined in the second duty determining means that the duty reference rate-of-change has not been exceeded or which determines that the flammable refrigerant is not leaking when it is determined in the first duty determining means that the duty variation width has been exceeded and it is determined in the second duty determining means that the duty reference rate-of-change has been exceeded.

6. The refrigerant leak detector of a compressor of claim 5, wherein the first duty measurement reference time and the second duty measurement reference time are set to different times.

7. A refrigerant leak detector of a compressor, comprising:

a compressor that compresses and supplies a flammable refrigerant to a refrigeration cycle of a refrigerator;

a brushless DC motor that drives the compressor;

a switching circuit that supplies drive signals to the brushless DC motor;

control means that PWM-controls the switching circuit;

direct-current power supplying means that supplies drive-use direct-current power to the switching circuit;

drive value measuring means that measures drive values

such as voltage, current and power relating to the direct-current power supplied by the direct-current power supplying means;

first drive value determining means that determines whether or not the drive value measured by the drive value measuring means exceeds a drive value variation width where a drive value measured at a first drive value measurement reference time is used as a reference;

second drive value determining means that determines whether or not a time rate-of-change per unit time of a drive value measured at a second drive value measurement reference time by the drive value measuring means exceeds a drive value reference rate-of-change; and

refrigerant leak determining means which determines that the flammable refrigerant is leaking when it is determined in the first drive value determining means that the drive value variation width has been exceeded and it is determined in the second drive value determining means that the drive value reference rate-of-change has not been exceeded or which determines that the flammable refrigerant is not leaking when it is determined in the first drive value determining means that the drive value variation width has been exceeded and it is determined in the second drive value determining means that the drive value reference rate-of-change has been exceeded.

8. The refrigerant leak detector of a compressor of claim 7, wherein the first drive measurement reference time and the second drive value measurement reference time are set to different times.